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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CYRUS E. TABERY,
KHOI A. PHAN, BHARATH RANGARAJAN, BHANWAR SINGH, AND
RAMKUMAR SUBRAMANIAN,
APPELLANTS

Appeal 2007-2180
Application 09/955,517[1]
Technology Center 1700

Decided: April 22, 2008

Before ADRIENE LEPIANE HANLON, LINDA M. GAUDETTE, and MARK NAGUMO, *Administrative Patent Judges*.

NAGUMO, *Administrative Patent Judge*.

DECISION ON APPEAL

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[1] Application 09/955,517 ("517 application") was filed 18 September 2001, titled *In-Situ or Ex-Situ Profile Monitoring of Phase Openings on Alternating Phase Shifting Masks by Scatterometry*. The real party in interest is listed as Advanced Micro Devices. (Appeal Brief filed 22 September 2006 ("Br."), at v2.)

A. Introduction

Appellants ("Tabery") appeal from the final rejection[2] of claims 1, 2, 4, 5, 9–12, 25, and 26 under 35 U.S.C § 102(e) in view of Subramanian[3]. Claims 15–24, the only other pending claims, have been withdrawn from consideration. (Br. at 2.) We AFFIRM.

The claimed subject matter relates to an apparatus that makes masks for high resolution photolithography for manufacturing semiconductor integrated circuits. The masks fabricated by the claimed apparatus are called "alternating aperture phase shift masks," which we shall refer to as "A-masks." The masks fabricated by the Subramanian prior art reference are called "complementary[4] phase shift masks," which we shall refer to as "C-masks."

Appealed claim 1 is representative and reads:

A system that measures an etch of a mask feature, comprising:
one or more mask creating components
that fabricate one or more features on an
alternating aperture phase shift mask;

---

[2] Other rejections were withdrawn by the Examiner. (Examiner's Answer mailed 24 November 2006 ("Ans.") at 3.)

[3] Ramkumar Subramanian, Bhanwar Singh, and Michael K. Templeton, *Active Control of Phase Shift Mask Etching Process*, U.S. Patent 6,562,248, 13 May 2003, based on application 09/817,518 filed 26 March 2001.

[4] The term "complimentary" is used almost everywhere in Subramanian and in the 517 Specification, although the term "complementary" is used at Subramanian (2:55, 59, and 63). The latter usage appears to be correct, while the former appears to be a typographical or word-processing error. Except when quoting text, we shall use the term "complementary."

a driving component
that controls the one or more mask creating components;

an emitting component
that directs light on to at least one of the features on the alternating aperture phase shift mask; and

an analysis component
that measures one or more feature parameters based on a light reflected and/or refracted from the one or more features *via* a scatterometry system,

the measured feature parameters utilized by the driving component to control the mask creating component

during fabrication process to improve the fabrication process of the alternating aperture phase shift mask and

during post-fabrication process to improve quality control in the alternating aperture phase shift mask.

(Br. at 13; paragraphing added.)

The critical issues in this appeal are:

- what patentable weight does the term "alternating aperture phase shift mask" impart to the claimed subject matter? and
- does Subramanian teach using a measured feature parameter to "improve quality control in the alternating phase shift mask" during a post fabrication process?

B. Findings of Fact (FF)

Findings of fact throughout this Decision are supported by a preponderance of the evidence of record.

The Disclosures of the 517 Specification and the Subramanian Patent

1. The disclosure of the 517 Specification is similar to the disclosure of the Subramanian patent, in that large blocks of text are identical but for different numerical labels of elements in the Figures and references in the 517 Specification to "alternating aperture phase shift masks" (and occasionally "phase shift masks") where Subramanian refers to "complimentary phase shift masks."

2. Principal citations in the following descriptions are to the 517 Specification; the differences cited in ¶ 1, supra, will generally not be noted, but additional text in either disclosure, where relevant, will be highlighted.

3. The 517 Specification explains that the invention relates to "a system and method for measuring, monitoring and/or controlling the fabrication of phase openings in an alternating aperture phase shift mask." (517 Specification at 1:6–9 and 4:29-31; Subramanian at 1:7-8 (referring to "phase-shift masks") and at 4:28-30 (referring to "complimentary phase shift masks").)

4. According to the 517 Specification, "[t]he process of manufacturing phase shifting masks may consist of hundreds of steps." (517 Specification at 1:17-18; Subramanian at 1:41-42.)

5. The 517 Specification describes the preparation of a phase shifting mask by coating a transparent substrate, such as quartz, with an opaque chrome layer, etching apertures through the chrome, and etching the quartz substrate. (517 Specification at 1:18–20; Subramanian at 1:41-46.)

6. According to the 517 Specification, "[d]uring the quartz etching, the patterned binary masks (*e.g.*, chromium on quartz) can be fabricated to achieve the phase difference between alternating sides of the chromium-covered quartz." (517 Specification at 1:20-22.)

7. In the words of the 517 Specification:

> [c]ontrolling parameters like the width, depth and trench wall angles of the openings etched into the chrome layer and controlling the depth, width and trench wall angles of trenches carved into the substrate (*e.g.*, quartz, SiO_2) is required to enable controlled phase shifting of light that will pass through the mask.

(517 Specification at 1:23–26; Subramanian at 4:45-49 (Subramanian does not refer to trench wall angles).)

8. The 517 Specification describes and claims apparatuses and methods that control the mask fabrication process with "runtime feedback," which is said to provide "superior mask fabrication as compared to conventional systems and thus facilitates achieving smaller feature sizes with improved shapes via more precise control of phase shifting of light passing through the phase shift mask." (517 Specification at 5:4–7; Subramanian at 4:31-36, referring to "the complimentary phase shift mask.")

9. Moreover, according to the 517 Specification, "[m]easuring apertures after fabrication is substantially complete facilitates improving quality

control and thus facilitates achieving smaller feature sizes with improved shapes via more precise control of phase shifting." (517 Specification at 5:7–10.)

10. The 517 Specification explains that light reflected or refracted from apertures or other structures "is indicative of at least one parameter of the mask fabrication process (*e.g.*, depth of opening, width of opening, trench wall slope)," and the information can be used to enable "fabricating higher quality complimentary phase shift masks as compared to conventional systems." (517 Specification at 5:14–21; Subramanian at 4:40-48 (Subramanian does not mention trench wall slope).)

11. The system used by the invention to measure aperture parameters based on light reflected from the apertures and other features is said to include a "scatterometry system" that is coupled to the measuring system and the etching component driving system. (517 Specification at 8:8–11; Subramanian at 5:22-29.)

12. Each of Figures 1–14 and 17–22 of the 517 Specification is said to describe "an aspect of the present invention." (517 Specification at 8: 9–11; Subramanian at 6:1-3 *et seq.*)

13. Figures 4, 5-13, and 15-22 of the 517 Specification are materially the same as Figures 1, 5-13, and 15-22 of Subramanian, respectively, but for numerical labels of certain elements, shading, and some descriptive labels.

14. Figure 5 of the 517 Specification is said to show a phase shift mask **590** at five different stages of a process of fabricating apertures **504**, **506**, and **508** in chrome layer **502** and quartz layer **500** (517 Specification at 15:19–20; Subramanian at 9:12-40):

{Figure 5 of the 517 Specification is shown below:}[5]

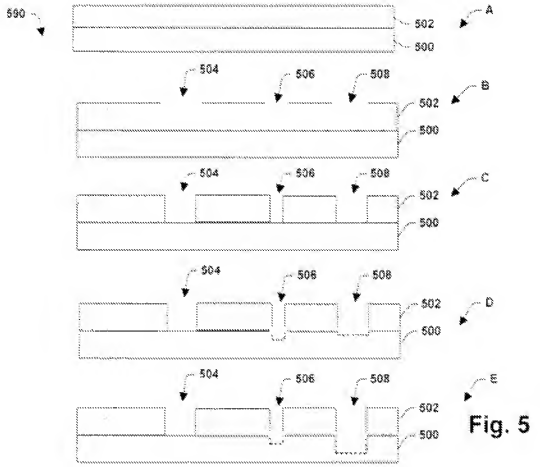

Fig. 5

{Figure 5 is said to show an A-mask of the invention at five stages of the fabrication process.}

[5] The text in curly braces before and after the Figures is provided to ensure compliance with section 508 of the U.S. Rehabilitation Act for publication of this Decision on the USPTO website pursuant to the Freedom of Information Act. It is not part of the Decision.

15.In the words of the 517 Specification:

> The present invention thus enables fabricating apertures of differing depths, widths and/or profiles where the fabrication of the different depth are monitored and controlled. Enabling fabrication of apertures of varying widths, depths and/or profiles thus enables controlling diffraction and/or phase shifting of light waves that pass through the apertures, with a resulting increase in the fidelity of image transfer.

(517 Specification at 16:4–8; Subramanian at 9:34-40.)

16.Figure 6 of the 517 Specification shows the critical measurement in the invention (see also Figures 1–3 of the 517 Specification):

{Figure 6 of the 517 Specification is shown below:}

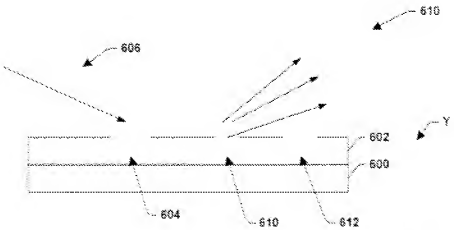

Fig. 6

{Figure 6 is said to show an embodiment of the invention.}

17.In Figure 6, light **606** reflects or refracts from apertures **604**, **610**, and **612** of a phase-shift mask **690** [not labeled in part **Y**], which comprises a transparent (*e.g.*, quartz) substrate **600** and an opaque (*e.g.*, chrome) coating **602**; the reflected or refracted light **610**[6] is detected and analyzed to yield information ("feature parameters") of apertures **604**, **610**, and

[6] [sic: label **610** is used to label two different elements in Figure 6 of the 517 Specification]

612 by components illustrated in Figure 7, *infra*. (517 Specification at 16:9-23; Subramanian at 9:41-61 (Subramanian refers specifically to "complimentary phase shift mask **590**").)

18. A block diagram of the invention is said to be illustrated in Figure 7, reproduced below:

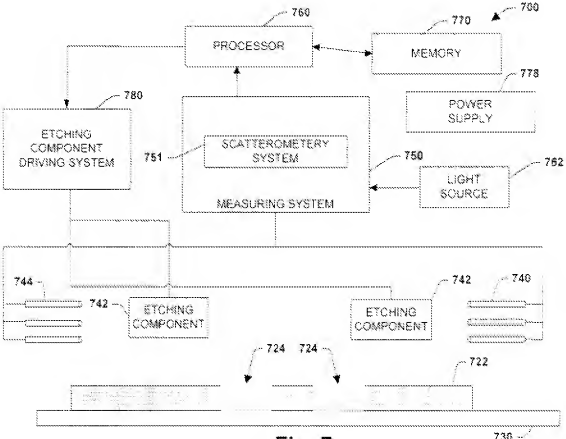

Fig. 7

{Figure 7 is said to show the system of the invention.}

19. In Figure 7, apertures **724** in A-mask **722** are illuminated by light sources **744**; light reflected or refracted by features on the mask is collected by detectors **740** and processed by a measuring system **750** that comprises a scatterometry system **751**; the parameters are processed by processor **760** and used to control etching component driving system **780**, which drives

etching components **742**. (517 Specification at 16:28 to 18:17; Subramanian at 9:62 to 10:48.)

20. In particular, the 517 Specification teaches that "[o]ne or more light sources **744** project light onto respective portions of the mask **722**. A portion may have one or more apertures **724** on that portion." (517 Specification at 16:32 to 17:1; Subramanian at 9:66 through 10:1.)

21. Figure 11, shown below, illustrates a table of acceptable and unacceptable signatures:

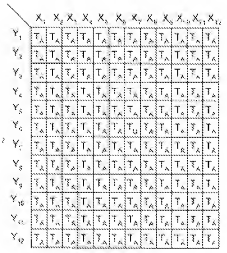

Fig. 11

{Figure 11 is said to show a Table of signatures.}

22. In the words of the Subramanian patent and the 517 application:

> It can be seen that all the signatures are acceptable except a signature for grid X_7Y_6. The set of signatures depicted in FIG. **11** can be analyzed collectively as a master signature, can be analyzed in subsets to evaluate, for example, intermediate etching progress, and/or can be analyzed individually to determine whether an acceptable etching condition exists. The analysis of the signatures can be employed *in-situ* to control the etching component driving system **80** (FIG. **7**), so that finer

> depth [and/or] width control {and/or profile} of the etching may be achieved.

(517 Specification at 20:3–10; Subramanian at 11:58–67; emphasis added; square brackets indicate material [deleted] and braces indicate material {added} in the 517 Specification.)

23. The 517 Specification continues, "In one example of the present invention, the analysis of the signatures can be employed *ex-situ* to determine whether a substantially completed mask has been fabricated within desired tolerances." (517 Specification at 20:10–12.)

24. Figures 13 and 14 of the 517 Specification are said to show flow diagrams for an *in-situ* (fabrication) process, and a process that can be adapted for an *in-situ* or an *ex-situ* (post-fabrication) process, respectively:

{Figures 13 and 14 of the 517 Specification are shown below:}

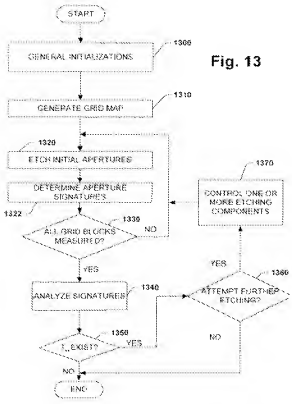

Fig. 13

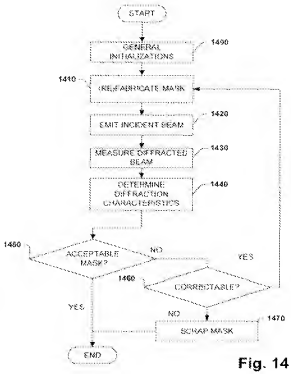

Fig. 14

{Figures 13 and 14 are said to show two different processes of the invention.}

25. The flow chart shown in Figure 13 of the Subramanian patent appears to differ from the flow chart shown in Figure 13 of the 517 Specification in the numerical labels and the position of the boxes on the right hand side; but the connectivity (*i.e.*, the decision structure) appears to be identical.

26. In an embodiment, the process illustrated in Figure 13 of the 517 Specification comprises a general initialization **1300** and generation **1310** of a grid map for the mask; initial apertures are etched at **1320**, followed by measurement of the aperture signatures at **1322**; the status of the process is checked at **1330**—if the grid has not been completed, etching continues at **1320**—but if it is complete, the signatures are analyzed at **1340**; the results of the analysis are then checked for

unsatisfactory matches with the desired parameters at **1350**. (517 Specification at 21:1-4; Subramanian at 12:31-47.)

27. In the words of the 517 Specification:

> If the signatures are acceptable, the processor ends the iteration of the etching process. If at **1350** an unacceptable signature is found, the process advances to **1360** where a determination is made concerning whether further etching attempts will be made. If no further attempts are to be made, then the mask can be marked for further processing and/or destruction and alarms may be sent to subsequent methods and/or apparatus concerning the unacceptably etched portion of the mask, after which the etching process concludes.

(517 Specification at 21:15–21; Subramanian at 12:48–57; emphasis added.)

28. The 517 Specification continues:

> In one example of the present invention, at **1350**, rather than the determination concerning whether a single unacceptable signature has been found the determination may concern whether an unacceptable number of signatures, and/or whether a cumulative error indicated by the collection of signatures has been received.

(517 Specification at 21:21–24.)

29. The 517 Specification and Subramanian continue:

> If the determination at **1360** is YES, then at **1362** the processor controls relevant etching components to further etch the apertures and to attempt to achieve a more precise depth and/or width of the apertures. The present iteration is then ended and the process returns to **1320** to perform another iteration.

(517 Specification at 21:25–28; Subramanian at 12:57–62.)

30. Figure 14 of the 517 Specification is said to illustrate another methodology, which is described in the following words:

> At **1400** general initializations and/or configurations are performed. At **1420**, the fabrication (*e.g.*, etching) of the apertures begins. At **1420**, an incident beam is emitted onto one or more apertures and/or gratings and at **1430** the beam diffracted from the one or more apertures and/or gratings is measured. At **1440**, the signatures from the apertures and/or gratings upon which the incident beam of **1420** was directed and which produced the diffracted beam of **1430** are analyzed. At **1450** a determination is made concerning whether an acceptable mask has been produced.

(517 Specification at 22:1-9.)

31. The process diagrammed in Figure 14, from START to **1440** is seen to be parallel to the process diagrammed in Figure 13 from START to **1340**.

32. The question **1450**, ACCEPTABLE MASK?, is seen to be functionally the same as the question **1350**, T_0 EXIST?

33. The 517 Specification continues:

> It is to be appreciated that while the method illustrated in Fig. 13 may be practiced *in-situ* to control fabrication, the method illustrated in Fig. 14 may be employed *ex-situ* in, for example, quality control applications.

(517 Specification at 22:9-12.)

34. The 517 Specification continues:

> If the determination at **1450** is YES, then an acceptable mask has been produced and the mask may be forwarded for further processing and/or use. If the determination at **1450** is NO, then processing proceeds to **1460**, where a determination is made concerning whether the fabricated mask is correctable. If the determination at **1460** is NO, then at **1470** the mask may be marked for discard and processing will conclude. But if the determination at **1460** is YES, then processing can return to **1410** where refabrication of the mask may occur.

(517 Specification at 22:12–18.)

35. The question **1460**, CORRECTABLE? is seen to be functionally the same as the question **1360**, ATTEMPT FURTHER ETCHING?; and the result, if the answer is NO, **1470**, SCRAP MASK, is functionally the same as END in Figure 13, while the result, if the answer is YES, **1410**, (RE)FABRICATE MASK, is functionally the same as re-entering the loop at **1320**, ETCH INITIAL APERTURES.

C. Discussion

"The PTO applies to the verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification." *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997).

"The law of anticipation does not require that the reference 'teach' what the subject patent teaches. Assuming that a reference is properly 'prior art,' it is only necessary that the claims under attack, as construed by the court, 'read on' something disclosed in the reference, i.e., all limitations of the claim are found in the reference, or 'fully met' by it." *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 772 (Fed. Cir. 1983).

On appeal, the burden is on the appellant to demonstrate reversible error by the Examiner. *See Gechter v. Davidson*, 116 F.3d 1454, 1460 (Fed. Cir. 1997) ("[W]e expect that the Board's anticipation analysis be conducted on a limitation by limitation basis, with specific fact findings for each

contested limitation and satisfactory explanations for such findings.") (emphasis added).

As an initial matter, we note that Tabery states that "[i]ndependent claims 1, 25 and 26 recite similar limitations." (Br. at 5.) Tabery has not argued the limitations of any of the claims separately. Accordingly, all claims stand or fall with claim 1. Moreover, Tabery has not disputed the status of Subramanian as prior art against the appealed subject matter.

Tabery seeks exclusionary rights to a machine. The machine defined by claim 1 comprises, at a minimum, one mask creating component that fabricates one feature on an A-mask that is controlled by a driving component; an emitting component that directs light onto that one feature of the A-mask; and an analysis component that measures one feature parameter based on light reflected or refracted from that one feature. The analysis component comprises a "scatterometry system" and provides the "measured feature parameter" that is "utilized by the driving component." The driving component in turn controls the mask creating component, using the measured feature parameters, "during the fabrication process to improve the fabrication process," and "during post-fabrication process to improve quality control" in the A-mask.

The Examiner found that all of the limitations of the claims are met by the system described by Subramanian. (Ans. at 4–5.) In particular, the Examiner found that the apparatus disclosed by Subramanian "is inherently capable of being used for creating either of the phase shift masks" (*id.* at 5) and that "[i]t is inherent that the measuring system could be used to improve quality control" (*id.*).

Tabery urges reversal on two grounds. First, Tabery finds that "Subramanian discloses a system for monitoring and controlling aperture etching in a complimentary phase shift mask," rather than in an alternating aperture phase shift mask. (Br. at 6-7.) Second, Tabery finds that Subramanian does not disclose *in situ* and *ex situ* monitoring and control of features of an A-mask. (Br. at 7.)

Central to both of Tabery's arguments is the assumption that the recitations of the A-mask in the claims necessarily define a distinct machine from a machine that performs similar functions on a different kind of mask, such as a C-mask. This assumption is not generally true. *In re Casey*, 370 F.2d 576, 580 (CCPA 1967) (*quoting In re Otto*, 312 F.2d 937 (CCPA 1963) (precedent indicates that "inclusion of the material or article worked on by a structure being claimed does not impart patentability to the claims")). A claim to a machine defines the machine by structures and relations between structures that permit (one could equally well say "enable" or "cause") certain transformations of physical subject matter to be carried out by the machine. To take a simple example, a claim to a device intended for dispensing a few small solid objects at a time, such as kernels of popped popcorn, may not be defined adequately by recitations of function and intended use to avoid anticipation by disclosure of a device for dispensing liquids such as oil. *See In re Schreiber*, 128 F.3d 1473, 1477-78 (Fed. Cir. 1997). The question in this case is whether Tabery has shown reversible error in the Examiner's determination that the recitation of the A-mask is not entitled to patentable weight in claim 1.

> Specifically, Tabery argues:
>
> A complimentary phase shift mask is inherently different from an alternating aperture phase shift mask. A complimentary phase shift mask is created by a two-step masking process. In the masking process, two masks are used to expose a gate layer, wherein light passing through one or more masks may be phase shifted to facilitate selective interference and cancellation of light waves. Then, a second masking operation is performed after the phase shifting masking operation. In this second masking operation, the complimentary features are obliterated by exposure to light passing through a second mask prior to forming the patterned resist layer. . . . to take advantage of complimentary phase shift masking, precise control of the depth and/or width of the openings in the complimentary phase shift mask is required. (*See* Col. 2, lines 54–67 and col. 3, lines 1-10).

(Br. at 6; underscore added.)

> In contrast, according to Tabery:
>
> an alternating aperture phase shift mask is created by a one-step masking process. Typically, transparent films are deposited over the desired transparent areas using a second level lithography and etch technique or vertical trenches are etched directly in the substrate. This creates transmission regions on either side of a patterned opaque feature, with one of these transmission regions being phase-shifted from the other. Controlling the width and depth of these regions etched into the substrate is required to enable controlled phase shifting of light that will pass through the mask. Thus, Subramanian *et al.* is silent regarding a system that facilitates monitoring, measuring and/or controlling the fabrication of apertures in **alternating aperture phase shift masks**.

(Br. at 7; underscore added, bold emphasis original.)

These arguments are not persuasive because they do not identify structures and functions required by the claimed subject matter that are not

present in Subramanian. Tabery's argument concerning the C-mask forming machine described by Subramanian conflates the process by which the C-mask is made with the process by which the C-mask is used. Tabery has not directed our attention to any evidence in the record that a feature of a C-mask, such as one of the apertures shown in Subramanian Figures 5 or 7, reproduced *supra*, must be made by the use of two masks that facilitate selective interference to define the apertures. Similarly, Tabery's description of making an A-mask, quoted *supra*, does not identify what structures and functions are required of a machine that makes an aperture in an A-mask that are not present in the machine described by Subramanian.

According to Tabery, a machine that makes an A-mask must control "the width and depth" of "regions etched into the substrate in order to enable controlled phase shifting of light that will pass through the mask." Tabery appears to argue—and this part of the argument appears to be unexceptional—that "precise control of the depth and/or width of the openings in the complimentary phase shift mask is required" in order to fabricate a proper A-mask. The weight of the evidence indicates that the machine described by Subramanian is capable of precisely controlling the width and depth of apertures in a C-mask. The question then becomes, has Tabery shown that an aperture in an A-mask necessarily differs from an aperture in a C-mask?

As shown in Figures 5 and 7 of Tabery's specification, which are reproduced and described *supra*, an aperture (e.g., **604**, **610**, **612**, **724**) is a feature of an A-mask. As Tabery argues in the underscored passages quoted *supra*, the width and depth of the regions etched into the substrates of both kinds of masks are required to enable controlled phase shifting of light that will pass through the mask. On the present record, Figures 5 and 7 of the

517 Specification and Figures 5 and 7 of Subramanian do not differ materially. In particular, Subramanian teaches that "[o]ne or more light sources **44** project light onto respective portions of the mask **22**. A portion may have one or more apertures **24** on that portion." (Subramanian at 9:66 through 10:1; emphasis added: FF 20.) Thus, Subramanian teaches and claims[7] a machine that measures and makes single features on masks, analyzes and further etches, as does the 517 application.

Tabery has failed to present any credible evidence that the apertures shown in Figure 5 of Subramanian, though they are features on a C-mask, differ from the apertures shown in Figure 5 of the 517 Specification, though the latter are features on an A-mask. Moreover, Tabery has failed to argue or to present any credible evidence that the process of light emission, reflection or refraction from a single aperture in a C-mask, or analysis of that light, or the subsequent control of etching of the mask, differs from the corresponding processes for making an A-mask, or analysis of light or the subsequent control of etching of the aperture in the A-mask. Thus, considering the full scope of claim 1, the recitation of an A-mask amounts to no more than recitation of a piece on which the claimed machine works. The recitation of the piece worked on does not, without more serve to distinguish the machine from an otherwise identical machine that works on a different piece. Accordingly, Tabery has not shown error in the Examiner's finding that Subramanian describes a mask-making machine within the scope of the limitations of claim 1 discussed thus far.

We now turn to Tabery's second argument, which we understand not to be limited to the type of mask worked on by the machine. Claim 1

[7] See claim 1, Subramanian at 15:16-40, especially ll. 25–31 and 35–37.

requires that the machine be able to "improve quality control" of an A-mask "during fabrication process" (*in situ*) and "during post fabrication process" (*ex situ*). If Subramanian does not describe such processes, the case for anticipation fails.

Subramanian clearly describes in Figure 13 "*in situ*" control of the mask creating component during mask fabrication to direct and improve aperture formation. As discussed *supra*, the recitation of the type of mask has not been shown to result in any structures or relations between structures required to etch an aperture, measure light reflected or refracted from the aperture, analyze the light by scatterometer, and use the derived parameters to control the further etching of the aperture. Therefore, the first prong of Tabery's second argument fails to show reversible error.

As for *ex situ* quality control, we note that both Subramanian and the 517 Specification state that:

> While . . . the methodologies of FIG. 13 and FIG. 14 are shown and described as a series of blocks, it is to be understood and appreciated that the present invention is not limited by the order of the blocks, as some blocks may, in accordance with the present invention, occur in different orders and/or concurrently with other blocks from that shown and described herein.

(Subramanian at 12:21–30 [typographical error "**15**" corrected to -**14**-]; 517 Specification at 20:26–31.) Both disclosures also teach that "[t]he set of signatures depicted in Fig. 11 can be analyzed collectively as a master signature." (Subramanian at 11:59–61; 517 Specification at 20:4–5.) And both Subramanian and the 517 Specification describe a stage in the process (Subramanian, Figure 13, **1360**; 517 specification, Figure 13, **370**) at which the question "ATTEMPT FURTHER ETCHING?" is answered. If the answer is "NO," both Subramanian and the 517 Specification instruct that

"the mask can be marked for further processing and/or destruction and alarms may be sent to subsequent methods and/or apparatus concerning the unacceptably etched portion of the mask, after which the etching process concludes." (Subramanian at 12:53–57; 517 Specification at 21:18–21; emphasis added.)

The analysis of the set of signatures as a "master signature," the destruction of the mask, and the sending of alarms "to subsequent methods and/or apparatus" have the ear-marks of post-fabrication adjustments of the process for future mask fabrication runs. Bearing in mind that the specifications are directed to those of ordinary skill in the lithographic mask fabrication arts, who are highly skilled and who are presumed to be able to rearrange the order of blocks in the flow diagrams of Figures 13 and 14 of Subramanian, we have no difficulty finding that Subramanian describes modification of subsequent processing in response to the preparation of failed masks. After all, to what useful purpose would a mask-designing engineer put an alarm "sent to subsequent methods and/or apparatus" that certain areas of a mask are not being fabricated to specifications? In a workplace dedicated to making masks under automated control, one answer must be: to adjust the mask-masking process to correct the errors that arose in those places. Such an adjustment meets the ex situ, post-fabrication quality control step required by claim 1.

Consistent with this finding, we find no material difference between the processes diagrammed in Figures 13 and 14 of the 517 Specification. The supposed distinction between the two processes—that only Figure 14 includes *ex situ* post processing quality control (517 Specification at 22:9-12)—does not withstand scrutiny. In the processes defined by

Figure 13, the decision node **1350**, asking if discrepancies between the measured signatures and the desired signatures, the analysis at **1360**, "ATTEMPT FURTHER ETCHING?," and the decision (YES, control etching; NO, mark for destruction, with alarms sent concerning the unacceptably etched portion of the mask (517 Specification at 21:17-24) correspond to the Figure 14 decision node **1450**, "ACCEPTABLE MASK?", which if correctable (**1460**), is sent for further processing, and if not, is scrapped (**1470**). Thus, the processes defined by Figure 13 of Subramanian have the same capabilities as those defined by Figure 14 of the 517 application.

It is well-established that "[a] reference anticipates a claim if it discloses the claimed invention "such that a skilled artisan could take its teachings in combination with his own knowledge of the particular art and be in possession of the invention." *In re LeGrice*, 301 F.2d 929, 936 (CCPA 1963) (emphasis original); *see also, In re Donohue*, 766 F.2d 531, 533 (Fed. Cir. 1985); *In re Graves*, 69 F.3d 1147, 1152 (Fed. Cir. 1995). Applying that proposition to the present facts, we find that Tabery has failed to prove reversible error in the finding by the Examiner that Subramanian anticipates the subject matter of claim 1. The other claims accordingly fall with claim 1.

E. Summary

In view of the record and the foregoing considerations, it is:

ORDERED that the rejection of claims 1, 2, 4, 5, 9–12, 25, and 26 under 35 U.S.C § 102(e) in view of Subramanian is AFFIRMED; and

FURTHER ORDERED that no time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED

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